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ABSTRACT

Audiotutorial instruction is one application of instruction tailored to individual needs. This method imposes certain requirements for instruction to be effective and for students to be properly motivated to learn. Some of the key requirements are: (1) individual control of the program material, (2) convenience of materials acquisition by the student, (3) simplicity of presentation methods, (4) costs, (5) timeliness of materials available, and (6) ease of courseware development. The Ampex Pyramid System satisfies each of these requirements. In its simplest form, the system provides high speed cassette copies of any program in its master storage bank. In a second form, the student accesses the system from a terminal located at a carrel. In addition, a feature may be added which allows the same functions described above to be performed at home using a touch tone telephone. Another feature is that of student response and conditional branching. Most importantly, the system has been purposely designed to allow a full range of presentations from very simple linear program presentations to sophisticated, fully interactive, multimedia lessons with conditional branching. All may be presented on the system without a significant investment of time and dollars in computer software. (WCM)

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NEW TECHNOLOGY APPLIED

TO

DISTRIBUTION OF AUDIO TUTORIAL LESSONS

A Paper Presented to Sixth Annual Audio-Tutorial

Congress Conference, San Francisco, CA

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NEW TECHNOLOGY APPLIED
TO
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Back at least as far as the days of Socrates, individualized instruction has been a significant force in education. Yet we often forget that learning is an individual process which, by its very nature, is at its peak when self paced. Because of our present day concept of education available for everyone, as opposed to the pre-twentieth century concept of education for the few, for the aristocratic, for those who could afford it, attention to the individual and his need has all too often taken a back seat. Our students have often fallen victim to the large lecture, to the overcrowded classroom, to the diploma mills of our nation.

In spite of, or perhaps because of, the trends of the last century, a dramatic change is taking place. I sense that there is a strong wave now sweeping education. Numerous signs are in evidence which show we are beginning to turn back to an emphasis on the individual. New concepts and phrases are popping up: "Open Enrollment", "Multimedia Instruction","Audio-Tutorial", "Computer Assisted Instruction","Open Classroom".

There is a plethora of probable reasons for the trend back to individualized instruction. Some of these are:

1. Open enrollment policies have attracted to colleges people with such diverse background and prior education that the only way many can be successful is through use of individualized techniques.
2. The Government, and to some extent industry and institutions of higher learning, have pumped significant amounts of money into developing new techniques in education which have permitted expansion of innovative programs.

3.. The problem of instructors not being able to devote enough time to the Socratic style--one on one or small group instruction has been helped considerably through the expanded use of media. Through widening use of relatively inexpensive audio tape or cassettes, slides, or film strips which can be used by individuals, the instructor can now extend himself far more easily then ever before. He can thus have more time to spend in direct contact with individual students.

4. New technologies have evolved to the point that learning effectiveness of newly developed products can be demonstrated. Learning systems which in earlier times were thought of by professional educators as so much ineffectual gadgetry, are rapidly becoming fully acceptable means of meeting the needs of educators for extending the learning process to the students they serve. In addition, with the constant advances in electronics technology, prices and price performance ratios of equipment are rapidly declining as the costs of education continues to rise. This makes individual instruction economic on a large scale, and not limited to the wealthy.

Because of the rapidly increasing emphasis on individual instruction, it behooves each of us to closely examine what new possibilities exist for use of technology to make this type instruction easier to implement, less expensive, and more effective.

During the balance of this discussion I would like to explore some new techniques and equipment which have and will continue to pave the way for expanded application of instruction tailored to individual needs. The focus here will be on audio-tutorial instruction. However, it should be emphasized that the methods and equipment which I will discuss can be easily adapted to multimedia.

The audio-tutorial part of individual instruction, as with other areas of this type instruction, imposes certain requirements upon the method of delivery

in order for the instruction to be effective, and the student properly motivated to learn. Some of the key requirements are:

1. Individual control of the program material - Independent pacing and control, whether it be by plan of the instructor or under direct control of the student is the very foundation of individualized instruction.
2. Convenience of materials acquisition by the student - All too frequently the inconveniences imposed on a student acts as to severely dampen interest, desire and enthusiasm. We must not, for example, expect a student to wait in long queues or repeatedly return to a media issue point only to find that there are insufficient copies of the desired materials.
3. Simplicity of presentation method - We must not expect students to become so involved in complex gadgetry, for example threading film projectors, that he becomes frustrated. Often such frustration can interfere with the student's ability to learn the material.
4. Costs - The costs of delivery must be compatible with the benefits achieved. This requirement is, of course, the most controversial in that educators cannot seem to agree on any commonly applicable method of measuring effectiveness or efficiency of learning which can then be used to evaluate cost effectiveness of instruction.
5. Timeliness of materials available - Program materials should be easily updated. If updating is difficult, there will be a reluctance on the part of the instructor to improve the presentation. In addition local control over course material is highly desirable. It is often difficult to get two educators or two schools to agree on a standard method of presenting the same subject matter.

6. Ease of Courseware Development - The method must be easy for an instructor to use, and must not represent a heavy burden on his time. Otherwise he will be unwilling to use it.

Armed with the above set of requirements, let us examine how, in at least one instance, industry has responded.

Certainly there are many means now available for delivery of audio-tutorial and multimedia materials. Slides and audio tape or cassettes are probably the most common. The methods increase in complexity and encompass such sophisticated areas as all digital computer assisted instruction. Such systems as PLATO and TICCIT fit this category. None of these has, however, been able to satisfy all the above criteria. None, except the system which I would like to now describe.

Specifically, I would like to introduce you to a system which is unique in its ability to satisfy all, and not just some, of the above: The Ampex Pyramid System.

Pyramid is a modularly expandable system which provides audic instruction, visual instruction, computer managed instruction, or any combination of these.

In its simplest form Pyramid's Audio-Tutorial System Configuration provides high speed cassette copies of any program in its master storage bank. Copies are made at 40 times play speed, and a copy can be provided to a user terminal typically in about a minute. User terminals may be located in a library, classroom or other suitable location, not necessarily near the central system. The process is done entirely under computer control. Computer control allows many benefits not available in manual systems. For example it allows the permanent recording of who obtained what program, how many copies of a particular program were duplicated, off line use as a general purpose computer, and many more. The high speed duplication process, unlike traditional dial access, allows students to obtain individual

copies substantially independent of prior access or other system activity. Number of terminals can be as few as one or as many as 10, 20 or more. Number of master programs stored is modularly expandable in groups of 16. Opeation is very simply handled through use of a 12 key keyboard similar to a Touch Tone* telephone keyboard.

In a second form of the audio-tutorial system configuration the student accesses the system from a terminal located at a carrel. Here the student gets his high speed copy of a program transferred to a buffer over which he has independent control via his keyboard. Once transferred, typically in about a minute, the student can play the program, rapidly skip materials he understands, rapidly backtrack and repeat materials he wants to review. He can also, if he desires, record and reproduce his voice along with or in gaps left by the instructor for language lab applications. All of the above functions may be done independent of other users or prior access. There are no long queues.

A feature may be added to the system which allows the same functions described above to be performed at home using a touch tone telephone. In practice, a student may call the number of the system from his touch tone telephone and identify himself and the program he wants by using his telephone keyboard. The system then makes a high speed copy for him on a system buffer. Using his telephone keyboard as a control device, he may then control the program in much the same way as he could from a carrel keyboard. He can rapidly advance, repeat portions he doesn't understand, and so forth. This feature is especially valuable for off campus use by shut-ins or others unable to get to the campus for instruction or instructional materials.

*Reg. TM AT&T

Another feature which may be added to the audio-tutorial system is that of student response and conditional branching. This is where the power of the system's computer shines. In this system the student requests a program which starts from the beginning. At appropriate points which the instructor selects, the program may ask one or a series of questions to which the student must respond using his keyboard. Using the responses the system may record and analyze the answers such as grading a test. It can also branch the program at high speed to another area of the same program or a different program-specified previously by the instructor for remedial reinforcement, or advanced work. The number of levels of branching is primarily limited not by the system, but by the imagination and abilities of the instructor.

It is significant that because of the modularity of the systems, any or all of the above system features can be combined in various quantities in the same system. In addition to the above audio-tutorial systems, the dimension of still frame visuals, motion visuals and alpha-numeric pages of information may be added. All these are displayed at a carrel or classroom on a standard TV monitor. These features may be obtained with the initial system or added later. In either case they bring the full dimension of computer managed instruction to the user. Visuals may be loaded onto the system using commonly available media formats. Still frames are stored on a video disc or videotape recorder. They may be loaded from slides, film strips, or graphics using a film chain. Motion visuals may be loaded onto video tape from 16 mm or 8 mm film, live action or off the air. Alpha numeric information may be entered by page and stored on a digital computer disc for later recall. Recall of alphanumerics

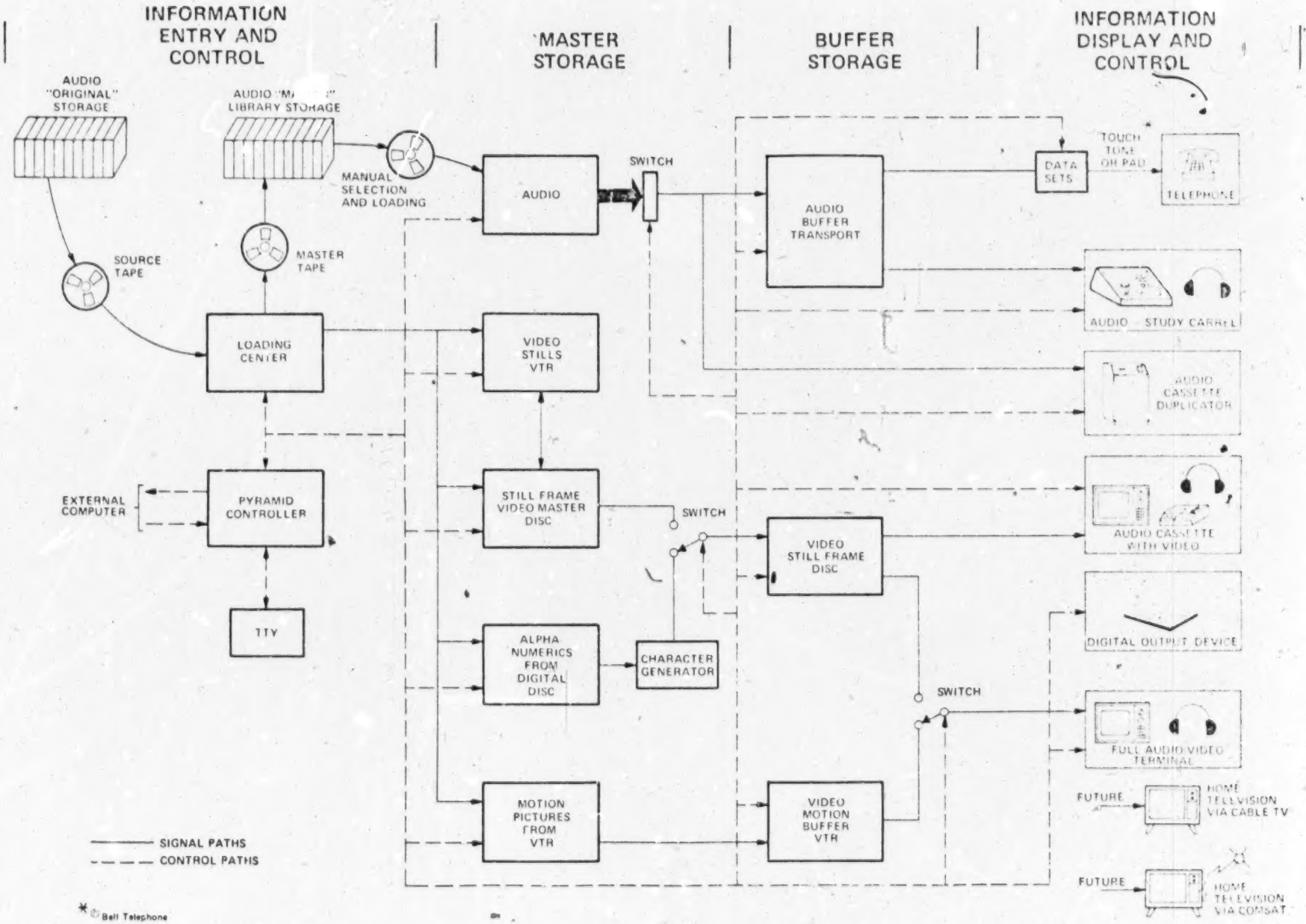
at the terminal can be separate, or superimposed over visuals. Audio materials are loaded into the master bank from standard 4 track 1/4" audio tape recorded at 3-3/4 inches per second.

At this time one key point needs emphasis. The system has been purposely designed to allow a full range of presentations from very simple linear program presentations, to sophisticated, fully interactive, multimedia lessons with conditional branching. All may be presented on the system without a significant investment of time and dollars in computer software. The system provides for the use of commonly available media as well as custom made media. Materials are presented in the format and sequence designed by the instructor. Thus courseware can be as simple or complex as the instructor desires. He does not need to be a computer programmer to use the system. Basically all that is required is an organized list of materials the instructor wants to present to the student requesting his lesson, in what order and at what times he wants them presented. If he wants to have the system accept student responses, he need only indicate when they should occur, and what the system should do with them.

The block diagram which follows summarizes the major features which Pyramid offers.

As you may have gathered, technology has come a long way in providing educators with the means of delivering audio-tutorial and multimedia material which satisfies all key requirements of individualized instruction. A challenge remains. Educators must develop new means and techniques of using the tremendous advantages which learning through media offers. Courseware and strategies must be developed. Incentives must be given faculty for such development. Instructors, media center directors, and administrators must have the courage to support these activities.

The important thing to remember is that the technology is here today to make individual instruction through media a widespread, effective reality. Its success rests with the educators' willingness to make sound commitments to apply it.



AMPEX PYRAMID SYSTEM, MASTER DIAGRAM